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Soil Conservation Service
U.S. Department of Agriculture

Soil Conservation

Devoted to the wise use of land and water resources

September 1969 Vol. 35, No. 2

Soil Conservation

Devoted to the wise use of land and water resources

Sediment . . .

Public officials and conservationists will be in Washington this month to give concerted attention to sediment problems (p. 34).

So it is timely that we have as guests in our magazine municipal experts actively dealing with sediment.

SCS Geologist John Roehl arranged through the American Water Works Association for the article on silt in water supply (p. 31). Kansas City water works men, Glen J. Hopkins and J. Robert Popalisky, reveal some aspects of water treatment that many soil conservationists may not have thought of before.

El Paso Public Works Director P. G. Dieter, Jr., joins our district conservationist, there, Richard Reed, in describing that city's extensive sediment-control works (p. 33).

New town

All the erosion and runoff problems that beset urban developers individually combine to plague the builder of a complete "new town," such as Columbia, Md.

SCS Conservationist Elmer Sauer has worked with the company's planners and engineers on the ground from the beginning. Our staff writer, Charlotte Conrad, and visual information specialist, Gene Alexander, visited the development and helped Sauer and SCS Geologist John Holeman tell how sediment control measures are being integrated into Columbia's operations (p. 35).

COVER: The pattern of dried and cracked mud is a familiar sight in streets and streambeds below unprotected building sites.

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Prepared in the Division of Information, Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C. 20250

CLIFFORD M. HARDIN, Secretary of Agriculture
KENNETH E. GRANT, Administrator, Soil Conservation Service
BEN O. OSBORN, Editor
GEORGIE A. KELLER, Production Editor

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"This is public land—your land and mine"

Road cuts and fills can be promptly stabilized with vegetation; in this case crownvetch was used.

Roadside erosion survey

Secondary roads account for most of sediment pollution coming from Wisconsin highways

By William M. Briggs
Conservation agronomist, SCS, Madison, Wis.

The eroding sections of Wisconsin roads, if joined end to end, would extend from the capital city of Madison to New York city, then back across the continent to Los Angeles.

This isn't to say that Wisconsin has more roadside erosion than any other state but that conservationists here have made a systematic survey of the situation and can name places and cite figures.

The inventory shows something more than 21,000 sediment-producing sites on the state's 87,000 miles of roads—a total of 3,711 miles of bare banks in an average of four locations in each mile. Figuring an average width of 16 feet, their combined area amounts to nearly 7,300 acres.

This is public land—your land and mine! Much of it drains directly into lakes and streams. For many years, students of sedimentation have recognized roadside erosion as one of the principal sources of the material progressively filling and fouling our surface waters. The survey gives a clear picture of the problem in this state. The inventory is believed to be the first of its magnitude in the Nation.

The Wisconsin Chapter of the Soil Conservation Society of America initiated this project in 1967. A subcommittee of the Natural Resources Council of State Agencies drew up procedures for a 100 percent inventory of all rural roads in Wisconsin.

Each county organized a local committee. Participating personnel and agencies included the Soil Conservation Service, Extension Service, Forest Service, Wisconsin Department of Natural Resources, Wisconsin Department of Transportation, Wisconsin Department of Local Affairs and Development, soil and water conservation district supervisors, County Agricultural Stabilization and Conservation Service committees, and county officials of Farmers Home Administration. Other local, state, and federal agency people frequently helped. The SCS district conservationist generally served as chairman. A number of county Technical Action Panels

Roadside Erosion and Control Needed in Wisconsin

Control needed	Town Acres	Roads Percent	County Acres	Roads Percent	State Acres	Roads Percent	All Acres	Roads Percent
Fertilize, seed, and mulch	2,640	50	1,130	64	150	69	3,920	54
Slope, fertilize, seed, and mulch	2,140	40	490	28	50	22	2,680	37
Structure, slope, fertilize, seed, and mulch	520	10	150	8	20	9	690	9
Totals	5,300	100	1,770	100	220	100	7,290	100

(TAPs) chose this as a special project.

Tabulations for each eroding area included length, width, and total area in square feet. Surveyors marked each location in a plat book now filed in SCS work unit offices. Compilations by townships were sent to the state committee for checking, then the information was summarized on a county and state basis.

Town and county roads account for 97 percent of all roadside erosion. Nearly three-fourths (73 percent) occurs along town roads; one-fourth (24 percent) along county roads; and the remaining 3 percent along state roads. Vegetation along state roads generally rates excellent.

The published report gives a state summary and a breakdown of the findings by counties. Tables include extent of erosion along roads—town, county, and state. One table ranks the 15 counties with the most erosion. It shows that one-third of all roadside erosion is found in six counties, and more than half occurs in 15 counties.

Persons making the inventory indicated the control needed on each eroding site. Total figures show that more than half (54 percent) of the sites could be controlled by fertilizing, seeding, and mulching. More than one-third (37 percent) requires sloping, fertilizing, seeding, and mulching. The balance or nine percent needs "the works" including structures, sloping, fertilizing, seeding, and mulching.

Only areas of more than 100 square feet were recorded. The figures, therefore, do not represent all of the roadside erosion. The committee prepared individual county supplements for town and county officials. These tabulate erosion along town, county, and state roads on a legal township basis.

Local news media publicized the survey widely and created an awareness of the problem. People and organizations have started an "action" program. Soil and water conservation districts are recognizing roadside erosion in their work plans. Districts and counties are purchasing hydroseeders and mulchers. Several counties and townships are developing policies for proper control of roadside erosion.

The report, distributed widely, urges local, county, and state officials to take corrective action as soon as possible. Recommendations include:

(1) Develop action programs giving consideration to adopting timetables for achieving adequate control.

(2) Consider purchase and use of specialized seeding and mulching equipment.

(3) Within the next 5 years, control every site reported that is a major source of sediment in Wisconsin's surface waters.

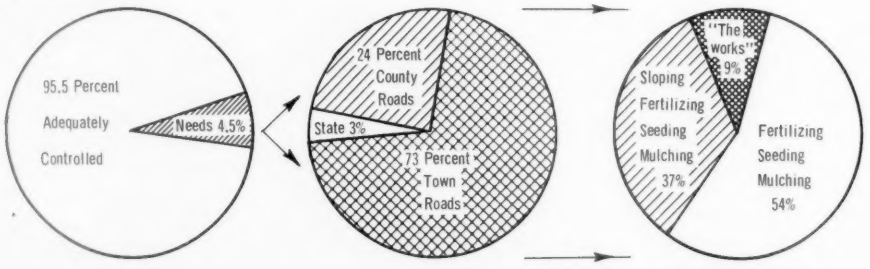
(4) Consider incentive funds of some sort, including any available for public works, as a way to help speed up roadside-erosion control.

(5) Establish vegetation on all newly constructed road cuts and fills. Waiting for natural seeding is too slow. Provisions should be made to secure wider rights-of-way where needed.

(6) Build sediment-retention structures as a part of all new construction. Maintain them until permanent structures and vegetation achieve adequate control.

The time of gathering data proved opportune to collect other pertinent information. Local committees outlined selective brush management sites suitable for maintaining highway rights-of-way in native shrubs. They also recorded unsightly conditions, including dilapidated buildings, auto graveyards (three or more cars), and dumping grounds. These items were reported separately.♦

IN A NUTSHELL:



Total roads in Wisconsin

Where found: (of the 4.5 percent that needs control)

Kind of Control Needed (all highways)

Backwall of open pit vanadium mine (right) and spoil pile are challenge to conservationists.

From open pit mines to grass and pines

By Kipp B. Sullivan
Area conservationist, SCS, Little Rock, Ark.

Mounting concern for land left in ruins and streams polluted with sediment from surface-mining operations is engaging the attention of mining companies as well as the state and federal governments. Among the companies taking voluntary conservation measures to reduce these public hazards is the Union Carbide Corporation.

Each mining operation differs and corrective action varies, but the objective is to return, within practical limits, the maximum portion of mined surfaces to productive use.

Restoration work proceeds along with extraction at Union Carbide's open-pit operation near Hot Springs, Ark., where the company is recovering a low-grade vanadium ore. Conservation work under the direction of Chief Mining Engineer H. J. Monteith started as soon as waste dumps reached planned heights.

Vanadium is a steel-white metal that is quite common in nature but does not occur in the pure state, as gold, silver, and copper sometimes do. Although abundant, it seldom occurs in deposits rich enough to be mined and processed economically. The Hot Springs operation is the only major one in the United States being worked for vanadium alone.

Vanadium compounds added in small quantities to steel impart strength, toughness, hardness, and resistance to impact and abrasion. The metal serves as a catalyst in the production of synthetic rubber and in the manufacture of sulfuric acid. It is used as a cracking agent in petroleum refining. In pure form it may find uses in space vehicles because of its high temperature resistance characteristics.

The soft, clay-like ore contains approximately 1 percent vanadium oxide, producing only about 20 pounds of the metal from each ton of ore mined and processed. In addition, several tons of waste must be dug for each ton of ore. The deposits are such that all of the ore and waste must be removed from the open pits and the unusable material deposited in spoil piles outside the excavation. And it accumulates at an astonishing rate.

Mining Engineer Monteith's first

objective in instituting conservation procedures was to reduce the unsightly aspects of the piles and his second was to put the area to a productive use. Since the area covered by the spoil originally grew a mixture of shortleaf pine and hardwoods, he reasoned that pine timber would be the best long-range cash crop.

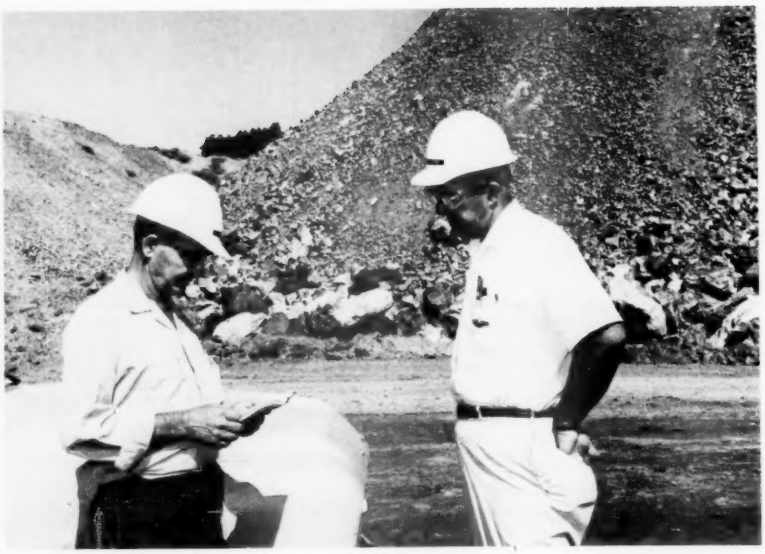
Monteith recognized that it would be necessary to stabilize the area as soon as possible to prevent excessive erosion while the trees were getting established. This posed a difficult problem because the piles are made up primarily of subsurface material mixed with vast quantities of unweathered rock and shale that contain little available plant food. The texture and composition of the material also limit storage of moisture.

On the advice of Soil Conservation Service conservationists assigned to the Lake Hamilton Soil and Water Conservation District, Monteith chose weeping lovegrass for the initial cover and stimulated early growth with 400 pounds of 10-20-10 fertilizer per acre. Smoothed tops and side slopes of the spoil piles were seeded with excellent results. In the following winter shortleaf pine was planted on 8-foot spacings.

Surface-mining operations often cause problems for wildlife through the destruction of plants used for food, cover, and nesting. Lovegrass and pine will make up for some of the loss, but the company is also planting slopes to autumn-olive, an ornamental shrub that produces large quantities of berries favored by at least 25 species of birds.

The engineer also knew that mining operations speed runoff and erosion and he feared that sediment would pollute Lake Catherine with adverse effects on swimming, boating, and fishing. So he had a series of silt basins and dams built above and in the stream that carries runoff to the lake. As basins fill with silt, they are dredged to restore their effectiveness.

To date, the company has established an effective cover of lovegrass and pines on 15 acres of mine waste. The built-up area is now more productive than the land underneath was in its native condition. When the ore is exhausted, some 200 acres of mine spoil will have been rehabilitated. The remaining pit eventually will fill with water and offer possibilities for wildlife and recreational development.



Above, Chief Mining Engineer H. J. Monteith (left) and Personnel Manager Jack Hamilton for Union Carbide's vanadium mine stand in front of growing mountains of mine waste. Below, SCS District Conservationist Earl D. Chapman (left) with Monteith stand more than 100 feet above natural ground level as they check second year growth of weeping lovegrass on leveled spoil.

Monteith says that cost of mine waste restoration is not a major factor. It should be considered just another part of the mining operation because "we owe this much to the community." If it is done as the work proceeds, while labor and equipment are available, it costs much less than it eventually would if waste were allowed.to accumulate.

"And sooner or later the job must be done," he says.♦

Problems of silt in public water supplies

By Glen J. Hopkins and J. Robert Popalisky
Director of Water Department and chief of Division of Water Purification, Kansas City, Mo.

Silt is widely recognized as a pollutant of water and one that can be of considerable importance to public water supplies.

Some persons believe that elaborate water-treatment facilities would be unnecessary if the silt content were comparable to the natural state when the native Indians were the only inhabitants of our watersheds. As a matter of fact, however, in some areas of the country, and particularly in the Missouri River, the silt concentration then may have equaled or exceeded present levels.

Perhaps the dominant influence of silt on water supply, municipal or industrial, is its encroachment on the storage capacity in water-supply impoundments.

Loss of storage capacity

Silt, as defined in this article, is "mineral particles intermediate in size between those of sand and clay." Erosion of upstream land causes silt to enter the impoundment as suspended matter carried by storm water along with the coarser sands and finer clays. As the velocity of the flowing water is reduced on entering the impoundment, the heavier particles settle quickly. Mudflats appear first in or near the coves formed by tributary watercourses. The smaller and lighter particles are carried farther into the reservoir, so that the entire bottom may be blanketed by silt deposits. The effective storage capacity of the reservoir is progressively reduced.

Equally important, if not more so, is the reduction in depth. During a prolonged drought, evaporation may cause much greater loss of water than does actual use by the municipality or industry. As the ratio of surface area to volume becomes less favorable, a larger percentage of stored water is evaporated.

During drought periods many municipalities have suddenly faced severe water shortages because their water storage had been drastically depleted by sediment accumulated in their reservoirs.

In the water-treatment plant, silt presents many problems and assumes a role quite different from that in the storage reservoir. Obviously, silt must be removed before the water is suitable for use. Yet the silt particles perform a useful function in some of the treatment processes.

The great variations in settling properties of sediment particles of different sizes and mineral composition greatly influence the design and operation of purification plants processing surface water. The treatment necessary to remove silt may vary from gravity sedimentation (settling) to very complex processes, depending upon the amount and character of the silt present.

Carrier of other pollutants

Silt suspended in water may serve as an effective adsorptive agent for certain pollutants in solution. This adsorptive capacity increases with the surface area of the particles.

The adsorption of organic matter in solution is an exceedingly complex phenomenon, depending on such factors as the nature and concentration of the organic matter, the size, amount, and type of silt, and on temperature, time in contact, and other features.

The organic matter commonly absorbed by silts includes the suspended long-chain fatty acids, the higher order alcohols, and other products of plant and animal life which surface wash carries into a stream. These substances cause bad tastes and odors in water supplies. To the extent that they are removed as the silt settles out of the water, silt is an asset rather than a liability to water treatment.

Silt removal

Methods of removing silt to clarify water date to 2000 B.C. The ancient Egyptians allowed turbid waters from the Nile merely to settle

". . . sound land management and good soil conservation practices are vitally important to communities and industries using reservoirs as a source of water supply."

for clarification before consumption. Some facilities for water storage and silt removal built by the ancient Romans in Jordan and other middle eastern countries are still in use as a source of drinking water by residents of rural areas.

Modern methods of silt removal and treatment of silt-laden water have become as complex as the silt itself. Purification of silt-laden waters for human consumption poses many problems. Of necessity, the finished water must be free of suspended material and appear clear to the user to be esthetically acceptable. Even microscopic, colloidally suspended particles must be removed; for viruses, bacteria, and other undesirable constitutents may be adsorbed on their surfaces.

The larger and heavier silt particles settle readily as the water is brought to a quiescent condition. The extremely small particles, however, are not removed by sedimentation and more elaborate treatment methods must be used.

Filtration was employed in ancient Greece and is still one of the leading methods for removing silts of small particle size, but it, too, falls short of complete effectiveness. Coagulation, flocculation, precipitation, and filtration must be employed successively to insure complete removal of particulate matter and fully reliable purification. In practice, all of these methods are commonly employed.

A flocculating agent

Silt particles play a very important and necessary role in the flocculation process. They provide nuclei around which masses of gelatinous material accumulate to form large particles that settle quickly, removing extraneous materials from the water. In actual operation, some plants processing water of low turbidity have found it advantageous to add some silt as an aid to the process of coagulation-flocculation.

The large reservoirs on the upper Missouri River and on principal tributaries have markedly reduced the silt content of the river water. The residual silts are principally of small particle size, and do not settle readily. As a result, the primary sedimentation basins at the Kansas City, Mo., water-purification plant no longer serve a useful purpose most of the time. Kansas City is now adding facilities for a third stage of chemical applications, mixing, coagulation, and flocculation as a part of its modernization program. These improvements will be installed ahead of the existing primary sedimentation basins and will restore these units to useful service.

The problem of sludge

Settled materials removed from waters by sedimentation alone or in combination with coagulation are known as "sludge." Sludge often consists of silt particles in combination with the hydrated coagulants and the partially oxidized organic matter removed from the water in the processes. In many instances, this sludge cannot be returned to the stream from which it was taken and must be disposed of by lagooning, dewatering, and landfill, by recalcining in the case of lime-soda softening, or other methods. Each of these methods is expensive, and some pose problems as complex as the actual removal of the silt.

Facilities for silt removal frequently represent a substantial addition to the capital cost of water-treatment facilities and add to the cost of maintaining and operating treatment works. If the silt load is variable, equipment and chemical application must be adequate to handle the maximum silt load even though it occurs only infrequently.

For the Missouri River, a stream of moderate organic pollution and heavy silt pollution, three stages of chemical application for coagulation-flocculation are desirable ahead of sedimentation, disinfection, stabilization, and finally filtration. While such facilities are quite expensive, both in capital and operating costs, it is rather doubtful that either construction costs or operating costs would be materially reduced if silt concentrations were lowered since such silt reduction would allow greater penetration of sunlight resulting in increased algae growths.

Watershed management

Although reduction of the silt load in the source of public water supplies may bring some additional problems and costs in water treatment, this is no argument for allowing erosion and sedimentation to dissipate necessary storage capacity in reservoirs. Watershed management and good soil conservation practices over the contributing drainage area can do much to prolong the useful life of any impoundment.

In most areas it is quite difficult for a community or industry to gain control of a watershed large enough to yield an adequate supply of water and to construct a reservoir large enough and deep enough to store enough water to last through a prolonged drought. Good reservoir planning can be negated if changes in land use cause a significant increase in erosion. Large volumes of silt can accumulate in the reservoir in a very short time, with little or no warning to the municipality.

The large reservoirs on the Missouri River include millions of acre-feet of capacity reserved specifically for the storage of sediment, adequate for a period of 100 years or more. This additional storage is very costly, but the investment is an absolute necessity.

Comparable need exists for extra capacity for sediment storage in the much smaller reservoirs constructed for water-supply storage. Small communities usually cannot finance water-supply reservoirs that have a 100-year useful life, and reservoir sites are seldom available for economical development of such increased capacity. In the absence of storage adequate for long range water-supply needs, sound land management and good soil conservation practices are vitally important to communities and industries using surface reservoirs as a source of water supply.♦

Texas city builds its own sediment-control system

By P. G. Dieter, Jr., and Richard W. Reed
Director of public works, city of El Paso, and district conservationist, SCS, El Paso, Tex.

People detouring around mud filled streets; weary city maintenance crews working around the clock to reopen streets to traffic; distressed residents shocked because their homes and yards were filled with mud.

That was the situation in parts of El Paso, Tex., in July of 1968 after a 6-inch downpour fell in 12 hours. Meanwhile in other parts of town, streets, homes, and businesses were not damaged by the storm, thanks to flood-control and sediment structures built by the city of El Paso.

Much of El Paso is located on the flood plain of the Rio Grande River and on the sandy sloping land below the foothills of the backdrop of mountains to this desert metropolis. A system of 39 detention dams with a total storage capacity of 4,955 acre-feet was installed to intercept runoff from the higher ground before it could drop its sediment load on the streets and lower areas of the city.

The dams were made possible by funds from two bond issues, one in 1958 and another in 1964, which authorized expenditures of $7 million. The city received no federal or state financial aid.

Since El Paso has a bright future for growth, additional planning has been done. The regional planning agency for El Paso County, the El Paso Council of Governments, has prepared a general land use plan, based in part on a soil survey provided by the Soil Conservation Service. The City Planning Department likewise has prepared a "planning atlas." These documents call for land use patterns that will reduce flooding and sediment damage to future developments.

The city also plans a flood-plain ordinance to reduce sediment and flooding damage in areas yet to be developed. The proposed ordinance will augment the present zoning ordinance to control undesirable land-development patterns.

The city has been working with the U.S. Army Corps of Engineers for flood and sediment control in the central and northeastern portions of the city since 1958. Plans completed in these areas have been accepted by the city and construction is expected to begin in 1970.

The Bureau of Reclamation and the El Paso Water Improvement District No. 1 cooperated by allowing their subsurface drainage ditches to be used for storm water. The city saved millions of dollars for rights-of-way and construction because of this cooperation.

Most of the flood-plain land is lower than the channel of the Rio Grande, so there is no direct discharge of floodwater into the river. Storm waters must be pumped into the river or allowed to run downstream in open drainage ditches for miles to a river channel outlet.

High peak flows of water from the urbanized area strain the capacity of the manmade river channel which was built according to a treaty

Many homes were ruined or damaged by sediment deposited by July 1968 floodwaters from new residential developments on the higher ground around El Paso (courtesy El Paso Herald-Post). At right is one of the 39 floodwater and sediment retention dams built by the city of El Paso.

with Mexico. This demands that floodwaters from urban El Paso be held temporarily by detention dams to trap silt and control the rate of flow into the Rio Grande channel.

The existing detention dam system has a positive discharge into the river by pumping. A new 800-cubic-foot-per-second lift station was completed in 1968 at a cost of $1.1 million, and a 300 c.f.s. station is being designed. Many smaller lift stations are scattered along the river for individual subdivisions and other developments.

More recently, the city, along with El Paso County and the El Paso Hudspeth Soil and Water Conservation District, applied to the Soil Conservation Service for a small watershed project under Public Law 566. This project would be located on the fringe of the urbanized area, both up-river and down-river from the city. With watershed-protection assistance, the city hopes to be able to plan flood and sediment control in the outlying areas before they are developed.

Sediment in a desert metropolitan area is a problem of great magnitude. Providing control prior to development is the only way to economically prevent sediment damage.♦

RC&D flood-prevention job passes test of storm

A cloudburst that dumped 4 inches of rain in 4 hours on Livingston, Tenn., left the town's industry and business unscathed, thanks to protective measures its citizens had taken against just such an eventuality.

More than 1,400 employees reported for work as usual at the Livingston Shirt Corporation on June 23 after the downpour with its thunder and lightning had rolled on in the early morning hours.

A similar downpour, 4.8 inches in 24 hours, in February 1962 caused damages in excess of $400,000 and threatened the permanent loss of the shirt factory with its $30,000-a-day payroll, the area's economic mainstay. But not this time! To the satisfaction and relief of the people of Livingston, the floodwaters flowed quietly past the factory in a prepared channel, into an underground conduit, and into Town Creek nearly a half mile away.

The Hull-York Lakeland RC&D Project, authorized for operation in 1966, helped the local people plan and install a unique flood-prevention project measure designed to prevent a recurrence of the 1962 disaster (See *Soil Conservation*, December 1968).

Key elements of the installation are 700 feet of open ditch and 1,100 feet of underground conduit. Part of the conduit, 54 inches in diameter, is buried 28 feet beneath the streets of Livingston. Completed in the summer of 1967, with the assistance of the Soil Conservation Service, the project measure cost approximately $212,000, of which the local sponsors paid $31,000. It functioned flawlessly in the recent storm.

Overton County Judge Elmo Swallows commented, "If the flood problem had not been corrected, I feel sure the shirt factory would be closed. How long? Who knows? Perhaps a week or longer, and thousands of dollars would have been lost in wages, damage to buildings, equipment, materials, and streets."

Livingston Mayor Raleigh Needham stated, "The benefits derived from the flood-control works during this one downpour could very easily be as much or even more than its total cost."

On the day following the storm Carson White, operator of a cafeteria in the affected area, said, "If the ditch and conduit had not been there, we wouldn't be open for business. Instead, we'd be shoveling mud."♦

Sediment control conference to produce handbook

Review of a proposed new sedimentation control handbook for public officials is high in the order of business for the National Conference of Sediment Control in Washington, D.C., September 14–16.

The guide, financed by a grant from the Federal Water Pollution Control Administration, is to be the basis for a round of institutes to be conducted in 1970 by the National Association of Counties.

The draft of the guide was completed by the National Association of Counties Research Foundation collaborating with federal, state, and local agencies. The Soil Conservation Service was among the agencies providing information for the book.

The conference, the first of its kind, is sponsored jointly by the county association, the National Association of Soil and Water Conservation Districts, and the Soil Conservation Society of America. County, state, and regional officials, representatives of soil conservation districts, and state government representatives will attend.

Cooperating are the Departments of Agriculture, Interior, and Housing and Urban Development.

Attendance is by invitation. About 200 working participants and an equal number of observers are expected.

Conferees will hear authorities discuss the scope of the sediment problem in developing areas; techniques for dealing with soil erosion in critical areas; water-quality standards and case histories in sediment control.

A feature will be a 4-hour bus tour to see results of the Montgomery County, Md., sediment-control program.♦

Conservation in a new town

By John N. Holeman and Elmer F. Sauer

Geologist and district conservationist, SCS, Hyattsville and Ellicott City, Md.

The Town Center beside Lake Kittamaqundi (lower left of aerial photo) and the village of Wilde Lake (upper right) are focal points of development in Columbia, Md. Residents can launch sailboats and canoes from the dock on the south shore of Wilde Lake.

Built-in conservation measures are taking their place with other advanced ideas of urban planning and land use in the rapidly developing "new town" of Columbia, Md.

Contour plowing may not be on the agenda, but by the time this totally planned community is completed in 1981, many other restyled farm practices will have been adapted and applied on thousands of homesites, streets, and open spaces.

Columbia is a developer's dream city about midway between Washington, D.C., and Baltimore, Md. Enticed by a design for an integrated community of 110,000 people, home-buyers, apartment-seekers, and industries are coming to this new urban center in the countryside rather than settling on the advancing fringes of the two larger cities.

Population has risen to almost 4,000 since the first home was sold in 1967. An attractive combination of tall office buildings, enclosed shopping malls, residential villages, and open space offers a unique mixture of metropolitan advantages and small-town comforts.

Building in conservation

Accepted practices of conservation farming that had been commonplace in agricultural Howard County before the new town was planned by a nationally famous land-developing organization are being called into play again.

Soil loss and sedimentation traditionally have been regarded as unfortunate but unavoidable side effects of urbanization. Builders in Columbia, however, are striving to minimize the usual damages. With counsel from the Howard Soil Conservation District and technical aid from the Soil Conservation Service, they are testing and using structures and methods to control runoff and erosion during construction and prevent permanent damage.

Columbia's creator, James W. Rouse, head of the Rouse Company, signed a cooperative agreement with the district in 1966. The Soil Conservation Service has worked with engineers in the Columbia Management and Maintenance Division since the first request for technical assistance came 3 years ago. Conservation and construction skills first joined forces to build a wildlife pond and stayed together for sediment control of ever-widening scope in the development.

Original plans for the 16,000-acre tract did not provide for soil protection and sediment control during construction. As mutual understandings with developer, builders, and

Trees (left) preserve the natural look and protect soil and neighbors' yards. Jute netting (above) stabilizes a steep slope.

bulldozer operators have improved, however, several SCS remedies for critical areas have gradually been incorporated into standard seeding and grading procedures. Emphasis is changing gradually from "cure and cleanup" to prevention and careful site preparation.

Protecting the cityscape

Trees, natural topography, and ground cover are retained wherever feasible for the beauty and protection of each subdivision. Columbia's deep, well-drained soils have few limitations for either residential and industrial buildings or sanitation systems. But the soil erodes readily when ground cover on slopes is disturbed.

Problems used to start when grading stopped. Now a simple addition to standard procedure keeps much of the soil in place and out of Columbia's lakes, streams, and streets.

After earth is reshaped for the installation of curved roads, 10-foot strips on each side are smoothed and seeded by a private contractor. The predominantly acid soils are limed and fertilized to suit soil test recommendations. Both hydroseeding and conventional methods have been used to put in annual ryegrass and a mixture of Kentucky 31 fescue and bluegrass.

Asphalt mulch (chopped straw sprayed with a tacking solution of asphalt emulsion) has proved effective and economical on areas where cover is being established.

Other manmade mulches are being evaluated on a roadside test strip. Asphalt and fiberglass alone and in combination with each other are being compared with excelsior netting and cellulose mat.

Stabilization techniques

Builders are urged to stabilize lots with at least partial seeding or sodding before turning them over to new owners. Residents may then arrange for final landscaping without unwittingly contributing additional sediment to the city's manmade lakes.

Erosion has been a problem on some of the original lots as well as in areas currently under construction. Diversion berms and other structures which slow and spread water were installed to restore stability. Jute is being used in swales and drainageways which conduct high velocity waterflows away from buildings and construction sites. Where proper measures have been taken, sediment production has been reduced 80 percent.

Columbia's subsurface utilities have also been a source of concern and sediment. Installation of underground lines for water, sewer, gas, electricity, and telephones has been difficult to coordinate. It is hoped that, with more experience and cooperation, utility companies can reduce sediment output from repeated excavations and numerous open, unprotected trenches.

Tailormade trap

Ditchbank erosion seems minor when compared with the sediment-production potential of a shopping center site or one of the other vast expanses of bare land visible in youthful Columbia. To make sure that Columbians don't sacrifice future water quality and lake capacity for the convenience of a town center, sediment basins have been installed below some large sites.

In major construction areas, all vegetation must be removed. Bare soil is exposed to the elements for months. Since mulches and seed cannot be applied until final grading is completed, indirect control seemed to be the only practical way to deal wth such critical sources of sediment.

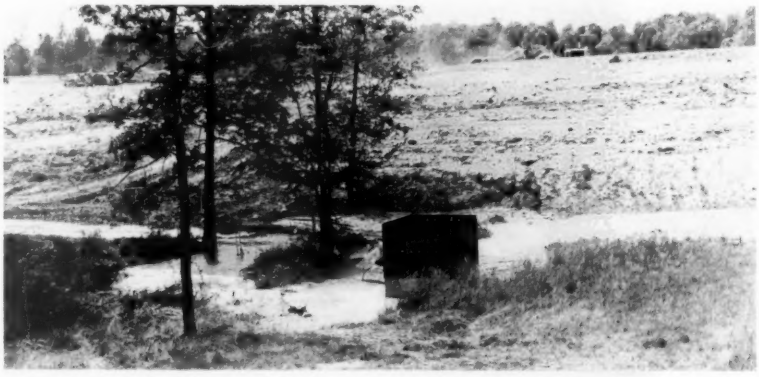
A debris basin designed by the Soil Conservation Service and installed at the expense of the Rouse Company helps protect Lake Kittamaqundi from shopping center runoff. In a year, it has been necessary to clean out the settling basin

A concrete-lined drainageway (above). While grading is still underway (right), fescue protects soil.

three times. But the expense, effort, and frequency of dredging the lake have been reduced.

Because of the first basin's success 12 others have been put below other disturbed sites to trap sediment before it reachs streams. Periodic cleanout—particularly after intence storms—is an important part of the overall control program.

"We can't afford to keep stabilizing large graded areas while we're still working on the site," says Paul V. Robbins, manager of land-development construction for Rouse. "It is more practical and less expensive to trap sediment than to put on mulches and seed before the major earthmoving work is through."



Silt laden runoff collects in this debris basin below a large site being graded for a shopping mall. As water rises in and around the metal box (above) sediment drops out, dries up, and accumulates for future use. Gabions (below) line the banks of a creek below Wilde Lake Dam. The tightly packed rocks and wire netting might be mistaken for real walls from a distance.

Manmade lakes at work

Columbia's lakes were originally designed and located to help control sediment; yet their future depth and beauty are at stake, too. Sediment dredged out of these aquatic traps has been stockpiled, mixed with dry soil, and later used to fill low-lying areas throughout the development.

Beating bank erosion

Onsite erosion controls solve one type of problem while they may create another. Water concentrated by careful grading, temporary diversions, and other surface channels runs into streams and increases their erosive power. While carefully planted grass protects roadbanks, a nearby unprotected streambank may be gradually eaten away. Natural undergrowth has been left to protect many of Columbia's existing waterways.

Constructing small grade-stabilization structures, installing gabions and riprap on streambanks, and sloping and vegetating banks with mulch and seed are among measures being taken to control this type of erosion. Jute, fiberglass netting, paper weaves, organic sprays, and other soil stabilization aids are also being tried.

Excelsior netting (top) and fiberglass over asphalt emulsion (foreground) are two manmade mulches compared on a roadside test strip.

The cost of erosion and sediment-control measures has been estimated at one-third of 1 percent of each lot's value. At that rate, soil conservation may cost Columbia around $2.5 million over the next 10 years. Although a cost-benefit analysis for this program has not yet been made, it is apparent that it will cost far less to control erosion and sediment now than to dredge lakes and clean up open space and backyards in the future.

A universal antidote for sediment-producing areas is an impossible dream; but conservation consciousness is developing with Columbia. This "new town" with a new look owes some of its continuing beauty, stability, and livability to changes in attitude among its developers and builders.

It takes teamwork

Onsite controls require cooperation all the way down the line. The man on the bulldozer is just as important in some ways as the man at the top. Both of them must understand what needs to be done and the importance of doing it. They can't be forced to try new techniques; but encouragement, examples, and technical assistance are offered whenever possible.

For a development of Columbia's dimension and diversity, the chain of command is complex. The Rouse Company, on behalf of the local Columbia management, cleared all original building and sanitation plans as a unit with the county. Builders then assumed control of construction operations in each of three (eventually seven) complete villages within the city of Columbia.

Responsibility for sediment and erosion control, therefore, shifts from developer to builder to foreman and eventually to the homeowner. Awareness, understanding, and willingness to expend money and effort must go with that responsibility, or much unnecessary sediment may be washed into streams and lakes.

Sediment-control ordinance

Since July 1, a state law for sediment control in the Patuxent River watershed (which includes all of Columbia) has given the Howard Soil Conservation District legal leverage for its own sediment-control program. Urbanization problems and patterns stimulated the drive for legislation and enforcement long before Columbia's advent; but plans for the huge development hastened acceptance of proposed pre-grading controls in Howard County.

The law requires soil conservation district approval of all plans for earthmoving within the Patuxent River watershed except for dwellings, outbuildings, or agricultural structures on lots of 2 acres or more. State, county, and municipal governments as well as private persons and firms must comply or be subject to fine or imprisonment.

District has manager

The Howard Soil Conservation District has its own manager who assists with inspection and public relations programs for the legislation within the district. The county government is now considering extending similar controls to the remaining 15 percent of the county outside the Patuxent watershed.

Efforts to control sediment pollution in Columbia are now part of the developer's comprehensive program to make sure that residents will enjoy as good a quality of life here in 1980 as they do in 1969.

Protection of natural and manmade resources during construction has long-range benefits which make today's work worthwhile. ♦

Jute netting and straw cover a newly seeded slope. Retouching became necesesary when bare spots appeared in this recently established lawn.

A conservation profile . . .

Iowa tree woman sells conservation along with 'operation windbreak'

Hi, Ellen. How're the windbreaks?" "Hi, Ellen. How's the rock collection?"

"Those are the typical greetings I get these days," explained Ellen Minnet of Spencer, Iowa.

And if you aren't careful, she will proceed to tell you just exactly how the windbreaks in Clay County are doing and why *you* need one.

And if you have any time left over, you might find yourself journeying to one of the schools to view the exhibit of rocks and minerals she has collected from 48 states.

Soil exhibit, too

Then, of course, you might like to drop in to see Ellen, who is employed as a clerk by the Clay County Soil and Water Conservation District and assigned to the Soil Conservation Service office. She will no doubt show you her soil profile exhibit. By the time you leave you will have a new understanding of the importance of soil and water conservation. This would, of course, include how to plant and care for many kinds of trees.

At the mention of trees, Ellen's face lights up and a certain twinkle comes to her eyes. This is one of her favorite projects—and a dream come true.

"When I first came here from Minnesota, I was amazed at the lack of trees," she explained. "It just killed me to see all those poor animals standing out in the fields with no shelter during the winter."

But the lack of trees was just one problem facing the district 8 years ago when Ellen started to work for the district. They also lacked money! There was only $3.15 in the district's revolving fund. The district uses this fund to sponsor tours, exhibits, awards, scholarships for teachers and students to summer conservation workshops and camps, and to cover other expenses.

Ellen put the two problems together and came up with a prize-winning solution—she would sell trees for the district.

District fund in black

And sell trees she has—more than 191,000 in the past 6 years. The district fund is now about $7,000.

"And that is with just 1 to 2 percent profit each year," Ellen explained.

But the going hasn't always been easy.

"The first 2 years were really the hardest," she explained. "You know there is nothing more doubting than a farmer. You have to give him proof. So you have to show and tell and tell and show."

Her first show, "Operation Windbreak," was a resounding success at the Clay County Fair.

"I didn't know anything about trees when I started. I traveled to five states and talked to everybody —nurseries, other districts, the Forest Service, wildlife conservationists, anyone I could find to tell me about trees," she said.

"While in Colorado and Wyoming, I told the Forest Service people about my idea. They promised to do what they could to help.

"One day just before the fair a big truck pulled up in front of the office and unloaded what looked like a huge coffin," she said. "Inside were 28 evergreens—all different sizes and species."

Ellen set to work on her exhibit. She planted each tree in a 5 gallon bucket and hauled in plastic, shavings, water, and trees. "Operation Windbreak" was soon ready for the public. She then talked trees for 8 straight days.

Showing and telling

She is still "showing and telling," at the fair and in the office. Each spring she crowds pictures and live potted trees into the SCS office.

In addition she plants a sample of each kind in her own yard as a showcase.

Children stop to hear Ellen Minnet's stories of rocks and minerals.

Besides selling trees, Ellen does all the ordering and runs the pickup and delivery service. She sends her order to a nursery in Fremont, Nebr., during May or June so she will be sure to get the quality and size she wants. The following April she borrows a truck and drives to Fremont to pick up her order.

Back home she delivers the orders to her buyers—farmers, churches, schools, parks, city people.

As a public service project, the district donates trees to a different park each year. In addition, last year Ellen distributed trees to every child in the seventh and eighth grades and gave them instructions on how to plant and care for them.

"When I first started, I wondered if I would ever see the fruits of this endeavor," she recalled. And with that certain sparkle that comes from a job well done, she added, "Now you can drive anywhere in the county and see beautiful windbreaks."

But selling trees is only a small portion of the work Ellen Minnet is doing for conservation and the people of Clay County, Iowa. She is a whole book of projects, ideas, and goals.

"The only way to get something done is to set a goal," she explained. Her rock and mineral collection is one goal that has taken many years to complete. The collection is on exhibit in the museum during the summer, but during the school year it is transported by buses from school to school all over the county. It has been displayed at the county fair for the past 3 years.

Ellen accompanies the popular exhibit to each new school where she enthralls both students and teachers with her stories about rocks and minerals—where they come from and how she got them.

She has collected most of them herself on her camping trips to every state in the Nation except Hawaii and Alaska, which she hopes to visit in the near future.

At the office, it's not unusual to find her surrounded by rocks and the various exhibits she has completed. Many are used to explain a complete farm conservation plan or the difference between kinds of soils to both farmers and urban people. Her soil profiles were on display at the fair this year.

She is also a speaker at night classes for the women of the Farm Bureau. She often takes her farm plan and soil profile exhibits to these classes where she explains what a soil map is, how to read it, and how to determine what conservation practices are needed.

"I often have these women coming in the next day asking just what I meant by this or that," she said.

Besides enjoying the classes, she has an ulterior motive. "You get to the husbands through their wives and children," she explained with a smile.

Ellen is presently working on an information project to educate the whole county on soil and water conservation. The project is already well underway.

And with Ellen Minnet behind it, Clay County, Iowa, undoubtedly will be a strong contender for the title as the Nation's best informed county on soil and water conservation.♦

Ranch for training Scouts in conservation

The rugged beauty of the Cimarron country in northern New Mexico offers a choice setting for teaching outdoor activities and for putting conservation practices into actual use.

And the sprawling Philmont Scout Ranch with a wide variety of wildlife and recreational facilities, 5 miles south of Cimarron, is the place to train Scouts from all rural and suburban areas and some foreign countries in such things as building a small rock dam, taking a basic soil sample, or improving a mountain forest trail, as shown in the photograph.

These conservation projects were taught last summer by Scout leaders trained by a team of Soil Conservation Service conservationists, who conducted classes for the leaders early in the season. ♦

County Agent Perley Colby explains a soil profile to campers.

City young people explore ecology at Spruce Pond Conservation Camp

By David N. Allan
Biologist, SCS, Durham, N.H.

The camp is deep in the woods. Tall, old pines cast cool shadows on granite ledges. Between their towering trunks one can see a lake sparkling in the warm, summer sun.

This is the setting for an unusual camping experience. Each June, for the past 22 summers, young people from New Hampshire and neighboring states have come to Spruce Pond Conservation Camp to have fun and spend a week learning about the world of conservation.

The Society for the Protection of New Hampshire Forests sponsors the privately owned and operated camp. It is unique in that training stresses ecology instead of hunting, fishing, archery, or game management. This helps each camper understand his relationship with his environment.

Instructors from the various resource agencies live with the campers and give them a better chance to understand the conservation professions. We have the opportunity to be with young people at work and play and to share the awareness, vitality, and hopes of youth.

The camp is directed by Leslie Clark, an educational consultant for the society with many years of work in this field. He makes the job of supervising the camp look easy, but it isn't.

Campers are divided into three groups of boys and one of girls. Groups are rotated so that each receives the same information. On the last day of the week they take a tour to see how landowners apply principles they have learned.

The same instructors have served as a team for several years. Wilbur Thompson, Merrimack County forester, takes youngsters on field trips into the woods and teaches them good forest management. They see tree plantations, woodland cutting practices, tree pruning and other practices. They learn to identify native trees and shrubs. But their most important lesson concerns the interrelationships of trees, soil, water, and animals.

Roger Leighton, Strafford County forester, and I teach about animal life and stress the relationships between animals and their environment. Youngsters see beavers at work damming streams and felling trees. They examine porcupine dens and discuss the effects these animals have on trees. Birdbanding and the use of mist nets are shown. The use of such knowledge in wildlife management is discussed.

Perley Colby, Hillsborough County agricultural agent, teaches about soils. He digs test pits to show soil profiles and explains the relationship of plants to different soil types with the help of soil maps of the Soil Conservation Service.

I teach water conservation. We talk about various uses and misuses of water, such as the pollution of New Hampshire's lakes and streams. The effects of water on plants, animals, and soils are pointed out during field trips, and we observe the many examples of succession of ponds to bogs in this glaciated area. We seine Spruce Pond for fish and collect samples with a plankton net so that we can observe the food chain in the lake. We also study the effects of sunlight on aquatic plants and animals.

The week's lessons come to a pleasant but practical conclusion on Friday, when half of the campers spend the morning on a forestry and wildlife field trip and the rest visit the Russell Yeaton farm in nearby Epsom.

The youngsters walk over the farm while Mr. Yeaton explains his conservation practices and why he applied them. They go into a managed woodlot that was once a pasture before a former owner went off to fight in the Civil War. They see these trees used as lumber in the new barn and in a son's new home. They see water conserved in

a farm pond and an irrigation system supplying it to the land. There are tile lines and ditches to remove excess water and improve drainage. They may see a black duck taking off from a drainage ditch or note where a deer has browsed on the sprout growth in a forest opening. Wildlife and the farm are tied together.

Many of these young people have never been on a farm. They can still see the old ways in Yeaton's old barn with its hand-hewn beams, wooden tunnels, and hay mows. His new barn has gutter cleaners; baled hay goes up to the loft by conveyor belt. The spotless milkroom fitted with shiny stainless steel bulk tanks full of milk shows them the work and money that go into providing a quality product. Before this field trip, few are aware of the cost of equipment and the hard work that put food on their tables.

But let's get back to the regular camp day. Plenty of time is left for swimming, fishing, or boating on the lake. A fast game of softball is usually in progress, but some take advantage of the time for relaxing. After supper discussion groups hear about conservation and present their views.

On a special evening, the instructors speak about their hobbies. Perley displays his collection of Indian artifacts. Wilbur, a knife collector, demonstrates the care of knives. Roger is a dowser and a weather forecaster. I demonstrate my use of art in illustrating wildlife and plant life.

Skits or sing-ins around the evening campfire at the beach end in a moment of quietness. The night wind sighs through the pines, a bird calls, and the stars seem closer. We sing "Taps" and the day ends.

This has been a memorable experience for more than 2,000 young people during the past 22 years. Several have chosen some branch of conservation as a life's work. Nearly all come away with a greater appreciation of their relationship to the world around them.♦

Conservation in action

Wind-erosion control practices bring relief to motorists, farmers

The highway patrolmen may not understand completely, but they undoubtedly are grateful for the improvement of conditions along certain stretches of roadway in Potter County, S. Dak.

There was the spring of 1967. The winter had been dry. The wind on Sunday, May 7, reached its peak, gusting up to 65 miles an hour.

That meant trouble on the highway, with the thick dust billowing from upwind fields. Motorists switched on headlights, but the beams could scarcely penetrate the walls of dust. Visibility was 6 feet or less much of the time. The harried patrolmen detoured traffic around the trouble stretches.

It was a relief for drivers to come to fields of Great Plains Conservation Program participants that were protected by stubble mulching, crop residue management, one-row tree belts, and wind stripcropping. Roads along these fields had nearly unlimited visibility. Farmers with these protective measures found their small grain crops relatively undamaged and replanting unnecessary.

Now, 2 years later, Potter County farmers and ranches have even more control over wind erosion. There is a feeling of satisfaction, they say, in knowing you have done all you can to protect your land.—VINCENT E. ZUTZ, *district conservationist, SCS, Gettysburg, S. Dak.*

New York

Crownvetch curbs erosion around city water tank

Crownvetch, multiflora rose, and red pine have stabilized and beautified the area around the James M. Caird Reservoir built in 1964 to meet the increasing domestic and industrial water needs of Elmira, N.Y.

Before conservation planting began in May 1966, silt and debris from an eroding bank above the 2-million-gallon steel tank caused recurrent maintenance problems. Excavation had stripped away all protective cover and exposed partially weathered rock and shale.

SCS soil conservationists serving the Chemung County Soil and Water Conservation District studied the site at the request of John G. Copley, general manager of the Elmira Water Board. They prescribed Chemung crownvetch—a variety

Approach to Elmira's water tank seeded to crownvetch and mulched.

Above, at 2 p.m. on the highway by unprotected field in Potter County. At left, wind-erosion control practices.

James D. Snow (left), P. E. Battle of the Calhoun County ASCS, and pond.

noted for its exceptional vigor developed at the SCS plant materials center at Big Flats, N.Y.

A diversion installed above the barren slopes kept runoff from washing away the mixture of crownvetch, red fescue, and perennial rye grass supplied by the district. Straw mulch and commercial netting provided by the Water Board held down the hand-broadcast seed.

An August drought killed many vetch and grass seedlings that had established by mid-June. Remaining vegetation gave some protection, but more crownvetch was overseeded in May 1967 to speed up the spread of permanent cover. By midsummer 1968, an excellent stand covered the bank with pinkish purple flowers.

In addition, the Water Board planted red pine trees on the bank of an access road. The diversion ditch and an abandoned road were seeded to red fescue and birdsfoot trefoil.

While wildlife habitat improvement was not the primary aim of the project, deer, rabbits, and song birds will benefit from food and cover supplied by the new plants.—JESSE L. MCWILLIAMS, *plant materials specialist, SCS, Big Flats, N.Y.*, and CHARLES J. CHARWAT, *district conservationist, SCS, Horseheads, N.Y.*

Alabama

Farmer creates recreation for his community

James D. Snow, a farmer of Hobson City, Ala., provided additional recreational facilities for his predominately Negro community and found a new source of income when he developed a fishing and recreation enterprise on his farm.

Snow, a cooperator of the Calhoun County Soil and Water Conservation District, is managing his 68 acres according to a conservation plan developed with assistance of the Soil Conservation Service. This conservation plan was used as the basis for approval of an Appalachian Land Stabilization and Conservation Program (ALSCP) contract with the Calhoun County Agricultural Stabilization and Conservation Committee. He will receive about $2,500 ALSCP cost share on the benefited 50 acres.

This ALSCP financial aid and SCS technical assistance resulted in the completion of a 2-acre fishing lake enterprise. Included are a 1-acre parking area and 9 acres of land that he cleared, seeded, and developed for picnic and recreational uses.

Snow has stocked the newly constructed pond with bass and bream and plans to open it to the public for fee fishing in late summer or early fall of 1970.

In the future, Snow plans to install access roads, sanitary facilities, picnic tables, provide boats, a water supply, and other facilities for the comfort and enjoyment of his customers.—H. C. DEBARDELEBEN, JR., *district conservationist, SCS, Anniston, Ala.*

Increased income taxes repay conservation cost

Conversion of an 815-acre salt-waterlogged farm from a tax write-off to a money maker for the Hankins family and for the U.S. Government is what Dee Hankins accomplished in 4 years with aid of the Great Plains Conservation Program.

In 8 years he will repay through increased income taxes the Government's cost-share assistance on the farm he bought in the Witchita Soil and Water Conservation District in Texas in 1962. It had changed hands six times in the preceding 4 years.

Hankins started his Great Plains Program in June 1963 and completed it in December 1967. A detailed cost-return analysis before and after treatment showed he increased his net return from $1.82 to $20.94 an acre.

Under his Great Plains contract, Hankins leveled 350 acres of land with his own equipment, sodded 200 acres of Coastal bermudagrass, lined 10,000 feet of concrete irrigation ditches, seeded 200 acres of rangeland, and built five farm ponds.—E. WAYNE CHAPMAN, *area conservationist, SCS, Vernon, Tex.*

Use of electricty by rural consumers

Almost 62 billion kilowatt-hours of electric energy were required by Rural Electrification Administration borrowers during fiscal year 1968 to meet the needs of rural consumers.

This k.w.h. input is the highest for any year on record. It is a gain of 5.5 billion over the previous fiscal year, and is 38.6 billion greater than the input required by rural electric systems in 1958.

More than 5.9 million rural consumers in 46 states were then on the lines of REA-financed electric systems. New consumers continue to be added at the rate of 150,000 a year.♦

Meetings. . .

Public land is theme of forestry group

"Destiny of the Public Lands" is the theme of the 94th annual meeting of the American Forestry Association at Colorado Springs, Colo., Sept. 21–24.

Chairman of the Public Land Law Review Commission, Congressman Wayne Aspinall, is one of the principal speakers on the public land topic.

State foresters hold meeting in Maine

The 47th annual meeting of the National Association of State Foresters will take place in Portland, Maine, September 28 through October 2.

Speakers appearing during the two general sessions include: William D. Hagenstein, president, Society of American Foresters; Ernest J. Hodges, president, American Forest Institute; Edward P. Cliff, chief, U.S. Forest Service; Kenneth E. Grant, administrator, Soil Conservation Service; and Gordon K. Zimmerman, executive secretary, National Association of Conservation Districts.

Dates and places

September 8–10, International Association of Game, Fish, and Conservation Commissioners, New Orleans, La.
10–12, American Fisheries Society, New Orleans, La.
14–16, National Conference on Sediment Control, Washington, D.C.
14–19, American Planning and Civic Association, Chicago, Ill.
14–19, National Recreation and Park Associate, Chicago, Ill.
21–24, Farm and Industrial Equipment Institute, San Francisco, Calif.
21–24, American Forestry Association, Colorado Springs, Colo.
21–25, National Association of County Agricultural Agents, Atlantic City, N.J.
28–Oct. 1, American Bankers Association, Honolulu, Hawaii
29–Oct. 2, National Association of State Foresters, Portland, Maine
October
October 1–4, National Conference of Editorial Writers, Indianapolis, Ind.
5–10, Water Pollution Control Federation, Dallas, Tex.
8–11, National Association of Biology Teachers, Philadelphia, Pa.
12–17, Society of American Foresters, Miami, Fla.
13–17, American Society of Civil Engineers, Chicago, Ill.
19–22, American Chamber of Commerce Executives, Detroit, Mich.
19–24, National Reclamation Association, Spokane, Wash.
21–25, Association of Engineering Geologists, San Francisco, Calif.
26–29, American Association of State Highway Officials, Philadelphia, Pa.
27–31, American Water Resources Association, San Antonio, Tex.

Rural people benefit from recreation facilities

Nearly three-quarters of a million rural people are benefiting from 629 large-scale rural community recreation facilities financed by the Farmers Home Administration since the program started 5 years ago.

Nonprofit rural groups received $83.3 million for swimming pools, picnic parks, athletic fields, and small golf courses and lakes. Some 780 individual farm operators received $5.5 million for recreation enterprises on their farms. And during fiscal 1968, 226 rural communities received nearly $24 million for recreation centers.

Funds for recreation loans are provided by private investors on an insured basis. ♦

New RC&D Project

Ten northeastern Wisconsin counties—Florence, Forest, Langlade, Lincoln, Marinette, Menominee, Oconto, Oneida, Shawano, and Vilas—have organized the Lumberjack Resource Conservation and Development Project to improve their economy and living standards with USDA technical help and financial assistance. The project has been approved for federal assistance.

The area's 5,704,500 acres of beautiful forests, lakes, and streams hold a vast potential for development of recreation features, the project plan points out. Some 1,786 lakes and 3,000 miles of trout-fishing streams are expected to pay dividends through tourism and recreational uses. ♦

Review

Mineralogy in Soil Science and Engineering. EDITED BY MATTHAIS STELLY. *1968. Soil Sci. Soc. Amer. Spec. Publ. 3. Madison, Wis. 106 pp., illus. $3.*

Those who already know a good deal about soil mineralogy and are looking for an up-to-date survey on the subject, particularly as related to research, will find it in these five papers given in a symposium at the 1967 meeting of the Soil Science Society of America.

P. H. Low draws upon 92 references to show convincingly that "pure systems of different clay minerals have different physical properties." He discusses these properties and argues for appropriate recognition of mineralogy in physical systems.

In his broad-scope paper about applications of soil mineralogy to chemistry and fertility investigations, C. I. Rich uses 102 references to set forth and explain re'ationships of mineralogy to soil chemistry, including ion exchange phenomena; the significance of crystalline structure to soil chemistry; and soil fertility as related to soil mineralogy.

R. J. McCracken approvingly explains the use made of soil mineralogy in the current pedological soil classification. He also identifies 10 problems that need to be solved in order to make full use of mineralogy in soil classification.

In his paper on engineering applications, Hans F. Winterkorn points out that mineralogy is important indeed, not only as clay-size particles but in the full range from small boulders to colloids. He attempts to present a "synoptic picture of engineering applications of soil mineralogy." This attempt, he acknowledges, is necessarily fragmentary, but it is illustrative of the importance of mineralogy to engineering.

W. F. Bradley, in his discussion of trends in mineralogical analyses, reviews the structural features of silicate minerals pertinent to their behavior in soils and points out recent instrumental methods that are making possible a better understanding of soil mineral reactions.—A. C. ORVEDAL, *soil scientist, SCS, Washington, D.C.*

Deserts of the World: An Appraisal of Research into their Physical and Biological Environments. EDITED BY WILLIAM G. MCGINNIES, BRAM J. GOLDMAN, AND PATRICIA PAYLORE. *1968. University of Arizona Press, Tucson, 788 pp. $15.*

This handsome outsize book is a major compendium of information on the world's deserts, resulting from a contract between the University of Arizona and the U.S. Army Research office. It is an appraisal of past and present research based largely upon critical review of published literature, as supplemented by consultation with specialists.

The treatment embraces desert geography (including maps), weather and climate, geomorphology, surface hydrology and materials, vegetation, fauna, and coastal zones. Extensive bibliographies are supplied for those interested in the ecology of the arid areas of the world. Indexes of subjects, authors cited, and scientific names of plants are included. A base reference of great value.—W. R. VAN DERSAL, *deputy administrator, SCS.*

New publications

The Measure of Our Land. (BY SOIL CONSERVATION SERVICE). *Rev. 1969. USDA PA-128. 22 pp., illus.* This bulletin presents the land-capability classification system the Soil Conservation Service has used for nearly 30 years as a practical means of helping farmers and ranchers make conservation plans for their land. It updates the popular bulletin of the same name published in 1951 and is based on the technical statement of the system in USDA Agriculture Handbook 210, *Land-Capability Classification,* by A. A. Klingebiel and P. H. Montgomery.

The land-capability classification reflects the physical limitations of soils for agricultural use. There are eight classes, each including many kinds of soil. The higher the number of the class, the greater the limitations on the use of the soils for cultivation. Thus, adaptability and freedom of choice of uses are good in the lower-numbered Classes I, II, and III, but decrease progressively in Classes IV, V, VI, VII, and VIII.

Urban Planning in Rural America. BY WILLIAM M. CARROLL AND ROBERT G. WINGARD. *1968. U. S. Dept. of Housing and Urban Development. 53 pp. $0.40.* Report of a study, aided by a federal urban planning assistance grant, conducted in 1964-65 for the Pennsylvania State University, Pennsylvania Department of Commerce and the Department of Housing and Urban Development. The inquiry was carried out by means of confidential interviews with professional planners, educators, officials, and citizens in six mid-Atlantic states.

The authors conclude, among other things, that "Rural residents appear to support the comprehensive planning process, but present plans do not reflect their concern for the natural environment . . . A principal limiting factor in the effectiveness of planning for urban development in rural areas is the lack of natural resource elements in comprehensive plans."

Ozark Range and Wildlife Plants. HEWLETTE S. CRAWFORD, CLAIR L. KUCERA, AND JOHN H. EHRENREICH. *1969. USDA Agr. Hbk. 356. 236 pp., illus. $2.50.* A fieldbook for identifying plants of the Ozark region and describing their values for wildlife and livestock. Plants arranged alphabetically by genera within three groups: grasses and grasslike plants, forbs and miscellaneous lower plants, and woody plants. The authors are wildlife ecologist (Crawford) and formerly range conservationist (Ehrenreich) of the U.S. Forest Service and professor of botany of the University of Missouri. There are many new drawings of plants and plant parts.

An Econometric Model for Predicting Water-Oriented Outdoor Recreation Demand. BY GLENN A. GILLESPIE AND DURWARD BREWER. *1969. USDA Economic Research Service ERS-402. 15 pp.* The model, one of the first of its kind, analyzes socioeconomic characteristics associated with water-oriented outdoor recreation activities of people: annual family income, education, sex, race, age, and occupation. The model was applied to a 1,000-family sample of people in the St. Louis, Mo., area.

Community Resource Development; How Cooperative Extension Helps. *1969. USDA PA-902. (8 pp.) folder.*

Evaluating the Economic Structure of a Rural Area. Demonstration of an Input-Output Analysis. *1969. USDA Economic Research Service ERS-386. 27 pp.* Describes one method applied to a

10-county area near Asheville, N. C., with a predominantly rural and low-income population.

DDT Used in Farm Production. By Theodore Eickers, Robert Jenkins, and Austin Fox. *1969. USDA Agr. Econ. Rpt. 158. 7 pp.* History and analysis of the current use of DDT in agriculture. U. S. output of DDT is about 40 percent less than the peak reached in 1962-63. Exports claim an increasing share—about 70 percent of total production in 1966-67.

Pesticide Application Equipment Owned by Farmers. By Robert Jenkins, Theodore Eichers, Paul Andrilenas, and Austin Fox. *1969. USDA Agr. Econ. Rpt. 161. 15 pp., illus.* Based on a nationwide (48 states) sample survey of farmers conducted in 1965 to measure the extent of pesticide used by farmers during 1964.

Food Aid and Agricultural Development. By Frank D. Barlow, Jr., and Susan A. Libbin. *1969. USDA, Foreign Agr. Econ. Rpt. 51. 85 pp., charts.* A summary of food aid to foreign countries from 1955 to 1966, mainly under Public Law 480, and its effect on agricultural development and related problems.

Proceedings of the 1969 National Conference on Water Conservation With Sprinkler Irrigation, Washington, D.C. *1969. Sprinkler Irrigation Association. 113 pp., $3.* Contains 19 articles on water conservation and sprinkler irrigation written by specialists in the federal government, universities, and private industry.

15 Years of Better Fishing. *1967. U.S. Dept. of Interior Bureau of Sport Fisheries and Wildlife. 32 pp., illus. $0.50.* A report on the progress in sport fish restoration during the 15 years since the passage of the Federal Aid in Restoration Act, popularly known as the Dingell-Johnson, or D-J, Act.

Pasture Productivity of Crested Wheatgrass as Influenced by Nitrogen Fertilization and Alfalfa. By George A. Rogler and Russell J. Lorenz. *1969. USDA Tech. Bull. 1402. 33 pp. $0.20.* Results of a study at the Northern Great Plains Research Center at Mandan, N. Dak.

Farm Labor Inputs, 1964. By Walter E. Sellers, Jr., and Theodore E. Eichers. *1969. USDA Econ. Res. Serv. Statistical Bull. 438. 45 pp., illus.* Survey includes detailed data for most farm types, economic classes of farms, and farm production regions.

The Toxicity of Some Organic Herbicides to Cattle, Sheep, and Chickens. By J. S. Palmer and R. D. Radeleff. *1969. USDA, Production Research Rpt. 106. 26 pp. $0.20.*

Productivity of Diverted Cropland. By P. Weisgerber. *1969. USDA Econ. Research Serv. ERS–398. 23 pp., illus.* Estimates of the average productivity per acre of cropland diverted from production under U.S. Government programs.

Airphoto Use in Resource Management. By Orville E. Krause. *1969. USDA Agr. Inf. Bull. 336. 26 pp., illus.* A survey of nonfederal purchasers of Agricultural Stabilization and Conservation Service airphotos.

The Poor, A Selected Bibliography. By Peter R. Maida and John L. McCoy. *1969. USDA Misc. Publ. 1145. 56 pp.* An interdisciplinary view of the literature to show the complex nature of the poverty problem.

Suggested Guide for Weed Control 1969. By Crops Research Division, Agricultural Research Service. *1969. USDA Agr. Hk. 332. 70 pp.* Mainly recommendations for use of herbicides.

Public Access to Public Domain Lands. By James A. Munger. *1968. USDA Publ. 1122. 64 pp., illus.* Two case studies of landowner-sportsman conflict.

Low-Cost Wood Homes for Rural America—Construction Manual.—By L. O. Anderson. *1969. USDA Agr. Hbk. 364. 112 pp., illus. $1*

Careers for Women in Conservation. *1969. U.S. Dept. Labor Leaflet 50. 8-page illustrated folder.*

Soil surveys

Mitchell County, Texas. By Herbert R. Stoner, Tommie J. Holder, Donald L. McClennen, and Kelly M. Templeton. *1969. 47 pp., illus.; maps 3.17 inches to the mile (1:20,000).*

Washington County, Arkansas. By M. Dean Harper, William W. Phillips, and George J. Haley. *1969. 94 pp., illus.; Maps 3.17 inches to the mile (1:20,000).*

Allen County, Indiana. By F. R. Kirschner and A. L. Zachary. *1969. 76 pp., illus., maps 4 inches to the mile (1:15,840).* Fieldwork by A. L. Zachary, J. U. Anderson, D. F. Post, T. E. Barnes, H. P. Ulrich, and A. R. Grunewald.

DON'T MAKE OUR COUNTRY A DUMPING GROUND

KAB-3

1969 wind-erosion damage at low point in record

Wind-erosion damage in the Great Plains this year is the lowest ever recorded in 35 years of annual reports.

A total of 995,150 damaged acres was listed in the final 1969 "blow season" report as of May 31, a decrease of more than 15 percent from the previous year.

SCS and the Great Plains Agricultural Council have kept reports of wind-erosion damage since 1934. In the drought years of the 1950's, the acreage damaged by wind in a single season reached as high as 15,789,000 acres.

Texas and North Dakota reported the greatest amount damaged and Kansas the least. Ninety-five percent of the wind-erosion damage was on cropland.

The reduced damage this year is attributed to better moisture conditions, fewer extremely high winds, and greater use of soil and water conservation practices by Great Plains landowners.

The record by states is as follows:

	1969 Acres	1968 Acres
Northern		
Montana	78,540	149,860
Nebraska	48,515	60,650
North Dakota	225,020	445,000
South Dakota	36,800	26,510
Wyoming	22,780	33,300
Subtotal	411,655	715,320
Southern		
Colorado	27,830	73,350
Kansas	7,900	58,000
New Mexico	25,300	13,700
Oklahoma	35,275	7,273
Texas	487,190	311,290
Subtotal	583,495	463,613
Grand Total	995,150	1,178,933

From the Administrator:

Sediment control and water quality

The Department of Agriculture's report to the President this year on agriculture-related pollution contained this paragraph:

"From the standpoint of quantity, sediment resulting from erosion of the land is the greatest contributor to pollution of surface waters. The effect of this pollution by sediment is expressed in the impairment of the quality of the water and the damage caused where the sediment comes to rest. The harmful effects are many—some physical, some chemical, and some biological."

Other sources of water pollution have drawn more attention than sediment, particularly the dumping of raw or partially treated sewage into our streams and the spewing forth of industrial poisons into our rivers.

But sediment also is a menace to the quality of water. It clogs our streams, silts in our harbors, fills our lakes and reservoirs with mud. It destroys opportunities for recreation, raises the price of water and electric service, and causes floods.

Much of the sediment which fouls our water comes from agricultural land. This has been a national concern for more than a generation, and we are making encouraging progress in dealing with the problem.

In recent years, however, an increasing load of sediment has been washing from construction sites, from developing areas around cities where farms are turning into housing developments and shopping centers, from highways and airports. Soil erosion can increase dramatically on land being converted to suburban uses—sediment discharges of up to 25,000 tons a square mile annually have been recorded.

The sediment load from these critical areas is in part a result of technological advance, made possible by the development of massive earthmoving machines capable of scraping away acres of soil-binding cover in a few hours. But it is also a result of the indifference or lack of information of builders and public officials. Sediment need *not* be the unavoidable price of land development. Sediment on construction sites can be controlled, in many cases with modifications of the same practices used so successfully on farms.

We are heartened, therefore, by the forceful leadership being given this month in the war on sediment by the National Association of Counties, a professional association of elected county officials. Together with the Soil Conservation Society of America and the National Association of Soil and Water Conservation Districts, the county group is sponsoring a National Conference on Sediment Control, set for September 14–16, in Washington, D.C.

Participants in this conference will, among other things, review a draft of NACO's forthcoming guide to community action programs for sediment control, a book which hopefully will form the basis for a round of NACO institutes next year. The guidebook has been prepared by NACO with the help of a grant from the Federal Water Pollution Control Administration.

SCS is proud to have a part, along with several other Federal agencies, in planning and presenting this landmark conference and in contributing information for the guidebook.

Now we are ready to work more closely with county officials across the Nation in developing and applying practices to help put a stop to erosion in developing areas.

Kenneth E. Grant

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Appalachian community has new economic outlook

Many a traveler in search of scenic beauty has followed the winding roads through the Appalachian hills of southeastern Kentucky and found his reward. But, until recently, many a resident of the same areas has failed to find a good living.

Now, the Blakes Fork Area of Whitley County is changing. The people have found a way to improve their community, to build up their economy, and to benefit from their natural resources—not the least of which is natural beauty.

The Whitley County Soil and Water Conservation District provides the local structure for launching new improvements, and the Appalachian Land Stabilization and Conservation Program has added the stimulus. The program, set up by Congress as part of the Appalachian Regional Development Act of 1965, was begun in Blakes Fork in 1966.

The people of Blakes Fork are eager to tell how the program has helped them. In some cases farmers have tripled production. R. L. Brown, who owns 116 acres in the area, said, "The previous owner of this farm had hoped to make it carry 12 cows and calves. My conservation plan in this program calls for 42 beef cattle, and I already have 46 head."

J. H. "Herb" Barnett, with the help of his son and small grandchildren, grows vegetables to supplement his income from beef cattle and tobacco.

"I bought a good Hereford bull and am keeping my best heifers to build my herd of cows up to 30," Herb said. "Bill Dempsey, district conservationist, SCS, helped me plan my farm to carry that many."

Eroded and unproductive pasture (above) is giving way to good fescue and ladino clover pasture in the Blakes Fork Area.

Other improvements are transforming the Williamsburg area into a progressive community. The county has built a new high school to replace two small, poorly equipped, high schools. A nine-hole golf course in the area provides entertainment and employment for local residents in conjunction with a picnic area and a fishing lake. And, a water district is being formed to develop a dependable water supply and attract businesses to the area.

With these improvements the people of Blakes Fork are looking to the future with new confidence and a determination to make the Appalachian landscape as productive as it is beautiful.—ROBERT S. REYNOLDS, *assistant state conservationist, SCS, Lexington, Ky.*♦